

Multifunctional Compton Inspection Tool, Phase I

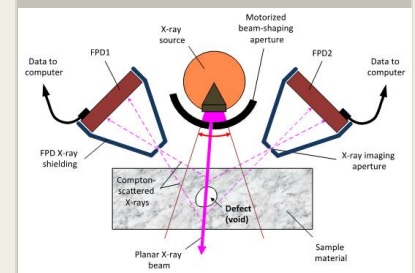
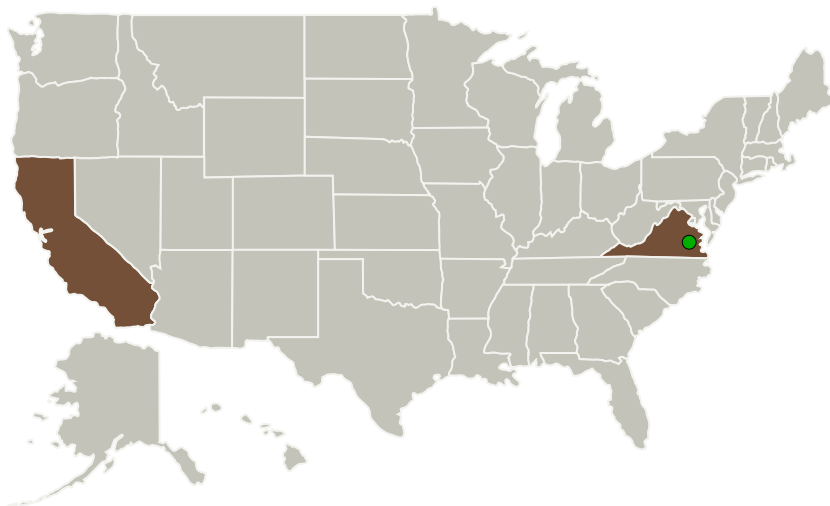
Completed Technology Project (2014 - 2014)



Project Introduction

To address NASA's need for advanced nondestructive evaluation (NDE) of complex built-up spacecraft structures, Physical Optics Corporation (POC) proposes to develop a new Multifunctional Compton Inspection Tool (MCIT) for operation onboard the International Space Station (ISS), based on POC's previously developed Compton imaging tomography (CIT) approach. CIT works by acquiring two-dimensional (2D) images of Compton-scattered X-ray radiation produced by multiple slice views of the object, with subsequent three-dimensional (3D) reconstruction of the inspected structure for high-resolution detection and localization of defects. The MCIT incorporates new features and modifications of the CIT, which permit it to operate in multiple modes with enhanced functionality, smaller form factor, and smaller weight. The proposed MCIT will allow noncontact, single-sided inspection of various spacecraft structures (such as micrometeoroid and orbital debris (MMOD) shields, pressure vessels, ISS modules, and thermal protection of visiting spacecraft) from either within the pressurized habitable compartments or open space. In Phase I POC will demonstrate the feasibility of using MCIT for NDE of spacecraft components by fabricating and testing a TRL-4 prototype, with the goal of achieving TRL-6 by the end of Phase II.

Primary U.S. Work Locations and Key Partners



Multifunctional Compton Inspection Tool Project Image

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Organizations Performing Work	Role	Type	Location
Physical Optics Corporation	Lead Organization	Industry	Torrance, California
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

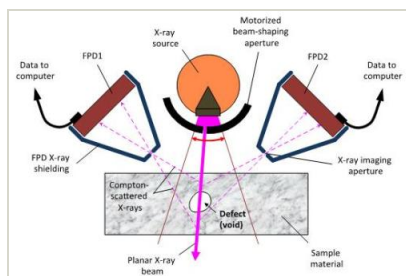
Primary U.S. Work Locations	
California	Virginia

Project Transitions

**June 2014:** Project Start**December 2014:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/137684>)

Images

**Project Image**

Multifunctional Compton Inspection Tool Project Image
(<https://techport.nasa.gov/image/127665>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Physical Optics Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

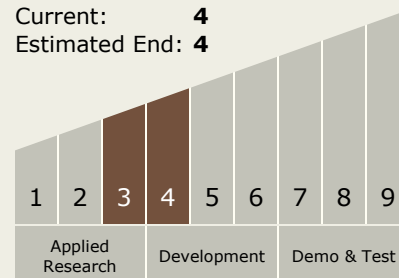
Carlos Torrez

Principal Investigator:

Naibing Ma

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.5 Nondestructive Evaluation and Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System